



AFM Module Six Quiz Two

Directions: There are 3 questions on this quiz, each with multiple parts. Show your work when directed and ask questions if you are not understanding. Review the definitions of factorial, permutation, and combination below before proceeding to the questions.

Factorial

Use when all items are used once. The ! means to multiply all numbers down to 1.

Example:

Ways to arrange 4 books on a shelf.

$$4! = 4 \cdot 3 \cdot 2 \cdot 1 = 24$$

Permutation

Use when order matters in an arrangement.

$${}_nP_r = \frac{n!}{(n-r)!}$$

Example:

Ways to 10 runners can come in 1st, 2nd, and 3rd place.

$${}_{10}P_3 = \frac{10!}{(10-3)!} = \frac{10!}{7!} = \frac{10 \cdot 9 \cdot 8 \cdot 7!}{7!} = \frac{10 \cdot 9 \cdot 8}{1} \cdot \frac{7!}{7!} = 10 \cdot 9 \cdot 8 = 720$$

Combination

Use when order does not matter in an arrangement.

$${}_nC_r = \frac{n!}{r! \cdot (n-r)!}$$

Example:

Ways to select 5 types of cookies if 8 types available.

$${}_8C_5 = \frac{8!}{5! \cdot (8-5)!} = \frac{8!}{5! \cdot 3!} = \frac{8 \cdot 7 \cdot 6 \cdot 5!}{5! \cdot 3 \cdot 2 \cdot 1} = \frac{8 \cdot 7 \cdot 6}{3 \cdot 2 \cdot 1} \cdot \frac{5!}{5!} = \frac{336}{6} = 56$$

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- 1) A group of 22 students need to form a line of exactly 9 students. Student A and Student B need to be either the fifth or sixth in line.
- Is this arrangement of students a permutation or combination? Justify your selection.



- b) Find the number of different orders possible. Show all work.
- 2) A spinner labeled 1 to 7 gives each of the numbers 3, 5, and 7 a $\frac{3}{10}$ chance of being landed upon. The chance of landing on each of the other four numbers is equal.
- a) If the spinner is spun 1,300 times, how many times do you expect it to land on the 5? Show all work.
- b) Knowing the probability of landing on a 3, 5, or 7, you can find the probability of landing on the 1, 2, 4, or 6. Find the probability of not landing on a 3, 5, or 7. Divide this by number of numbers remaining to find the probability of landing on a 1, 2, 4, or 6. Show all work finding the probability of landing on one of these numbers.
- c) If the spinner is spun 1,500 times, how many times do you expect it to land on the 2?
- 3) Expected value is found by multiplying each value by its probability and then adding together. Gains are positive values and losses are negative values. If an initial amount is given, this needs added to the gains/losses to find the expected value.

An investor bought 1,800 shares of a stock for \$7 a share. He estimates the probability the stock will rise to a value of \$30 is 18%, and probability it will fall to \$2.50 a share is 82%.



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a) Calculate the stock gain.

i) Amount per share: _____

ii) Number of shares: _____

iii) Find the total value of shares by multiplying the amount per share and number of shares.

iv) Original Purchase amount. Show work.

v) Find the stock gain by subtracting the original purchase from the total value.

b) Calculate the stock loss.

i) Amount per share: _____

ii) Number of shares: _____

iii) Find the total value of shares by multiplying the amount per share and number of shares.

iv) Original Purchase amount. Show work.

v) Find the stock loss by subtracting the original purchase from the total value. Remember a negative shows a loss.



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- c) Using the information found complete the table below to organize the investment information.

	Original Purchase	Stock Gain	Stock Loss
Value			
Probability	-----		

- d) What is the expected value for the investor' profit from buying the stock? Show all work.